

BNL interests for the PS2

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K. Brown, R. Connolly, W. Fischer, R. Gubta, M. Minty, S.
Peggs, D. Trbojevic.

October 27, 2008

PS2 MTE and non linear dynamics

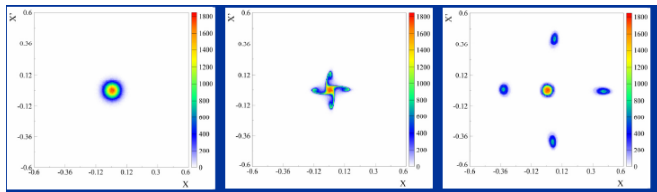
PS2 Instrumentation

PS2 Lattice

PS2 Magnet design

Conclusion

PS2 MTE and non linear dynamics



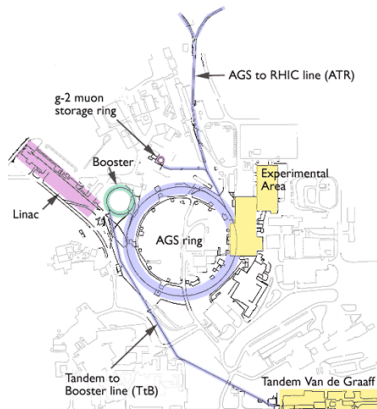
The multi turn resonant extraction allows the SPS to be filled in five turns of one PS2 cycle.

PS2 multi turn extraction is a state of the art beam extraction technique.

BNL has experience in the design and simulation of resonant extraction systems as well as expertise in the theory of resonances in accelerators.

The AGS can be used to test various questions associated with the technique.

AGS



AGS parameters:

- ▶ proton energy 1.2GeV to 28GeV,
- ▶ cycle time 4s,
- ▶ circumference 807m.

Sextupoles for resonant slow extraction.

PS2 Instrumentation

PS2 complex phase space manipulations would profit from fast beam profile monitor able to deliver turn by turn data.

Turn by turn data may be used to reconstruct the transverse phase space during the whole process island formations. The goal will be to provide a real time image of the phase space.

BNL has expertise in fast non destructive profile monitor that can be used as a routine tool for diagnostic and machine optimization purposes.

Possible synergies with FNAL and SLAC.

Ionization Profile Monitor

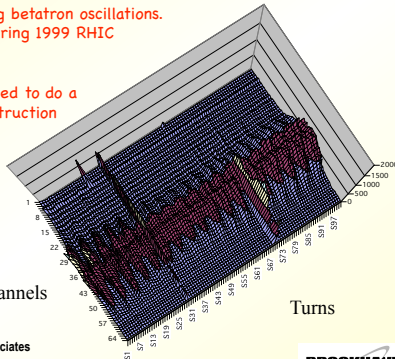
RHIC IPM record of first 100 turns of one bunch at injection showing betatron oscillations. Data were taken during 1999 RHIC commissioning.

These data were used to do a tomographic reconstruction of phase space.

R. Connolly, *et.al.*
Nucl. Instr. and Meth. A
443 (2000) 215-222.

IPM channels

Turns

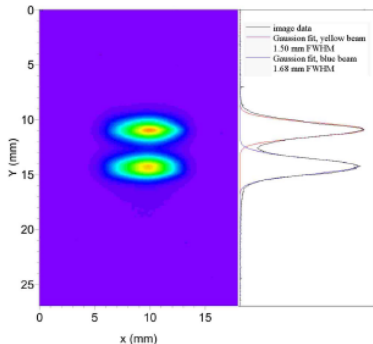


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R&D is needed to increase the cross section, improve the electron sensitivity for the front end, reduce the space charge effects.

Luminescence Profile Monitor



R&D is needed to reduce the vacuum contamination, photon generation and increase photon sensitivity.

Optical beam profile monitor and residual gas fluorescence at the relativistic heavy ion collider polarized hydrogen jet, T. Tsang, S. Bellavia, R. Connolly, D. Gassner, Y. Makdisi, T. Russo, P. Thieberger, D. Trbojevic, and A. Zelenski

PS2 Lattice

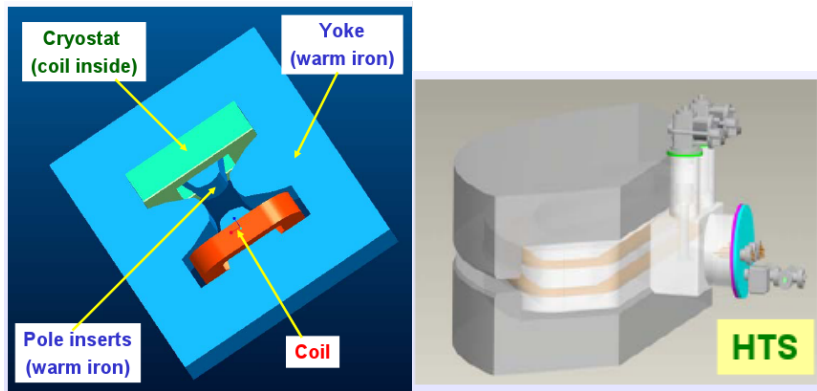
BNL has expertise and experience in lattice design.
It has already been exploited in past outside the LARP collaboration but it may be included if new common interests appears.

The collaboration could cover lattice optimization, optics, correction schemes, non linear effects.

Gamma Transition Jump for PS2, W. Bartmann, M. Benedikt, E. Métral, D. Möhl, CERN, S. Peggs, BNL, EPAC 08.

Lattice without Transition Energy for the Future PS2, D. Trbojevic, S. Peggs, R. De Maria Y. Papaphilippou, CERN, EPAC 08.

PS2 Magnet design



Courtesy R. Gubta, M. Harrison

The BNL expertise on iron dominated magnets may be exploited in a fruitful collaboration.

In the case superferric magnets for PS2 will get higher priority, there is a significant interest in pursuing R&D for HTS coils with nitrogen cooling.

Conclusion

Proposed activity:

- ▶ Studies on PS2 Multiturn extraction and fast beam profile monitor. People involved K. Brown, M. Minty, R. Connolly, (R. De Maria). Possible synergies with SLAC and FNAL.
- ▶ We initially request support to organize collaboration, define the problems to be solved, and work out the task divisions and schedule. The program will involve several BNL physicists each working at a level of 10% of their time. Support for travel for meetings and workshops will be required.

Potential collaborations (support is not requested at this time):

- ▶ Lattice optimization. People: D. Trbojevic, S. Peggs, (R. De Maria).
- ▶ Superferric magnet R&D. People: R. Gubta, (R. De Maria).